Site Seeing Intermediate Level

Site Seeing Learning Activities

These pre-protocol activities introduce students to the concept of a system. The students will explore different scales of the system, identify the components, and try to determine their relationship to each other. The concept of a system will help students understand why they are conducting the biometry measurements.

Purpose

To investigate the idea that every dynamic system has energy and matter in several different forms. Inputs and outputs will vary depending upon the physical components of the site, the plant and animal life, the determined boundaries or scale of the study and the season.

Overview

The class will travel to several different Land Cover Sample Sites. At each site, students will explore a larger variety of system inputs and outputs, and will use more complex methods of data acquisition and analysis. The students will use the data from each site to compare and contrast the inputs and outputs of the environments. The intermediate level of Site Seeing builds upon the concepts presented in the beginning level.

Student Outcomes

Science Concepts

Life Science

- Earth has many different environments that support different combinations of organisms.
- All populations living together and the physical factors with which they interact constitute and ecosystem.
- Humans can change ecosystem balance.

Geography

- How to use maps (real and imaginary)
- The physical characteristics of place
- The characteristics and spatial distribution of ecosystems
- How humans modify the environment

Scientific Inquiry Abilities

- Integrate data from variety of different data sets to gain dynamic understanding of how Earth system works.
- Identify answerable questions.
- Design and conduct scientific investigations.
- Use appropriate mathematics to analyze data.
- Develop descriptions and predictions using evidence.
- Recognize and analyze alternative explanations.
- Communicate procedures, descriptions, and predictions.

Level

Middle

Time

Three class periods or a field trip with one class period of follow-up

Materials and Tools

- Thermometers
- Rain gauges
- *Site Seeing Field Data Work Sheet*
- *Beaufort Scale Work Sheet*
- Heavy paper cup
- Paper

Preparation

Arrange for parents or other volunteers to accompany students to the sites.

Divide the class into teams as necessary. Ideally, each team would work on a different site but it may be more realistic to have groups working

on the tasks in a different order so they can share equipment.

Prerequisites

The beginning activity is recommended. If not used, students should understand the concept of system boundaries.

What To Do and How To Do It

Collect the data listed below at three different sites within your GLOBE Study Site. The sites should include an open place such as a field or playground, a site near open water, and a naturally vegetated Land Cover Sample Site (Closed Forest, Woodland, Shrubland, or Herbaceous Vegetation). Plan to visit the sites on the same day or on different days at about the same time.

1. **Temperature –** Measure the site's temperature 0.5 m above the ground, at ground level and 5.0 cm deep in the soil. See the *Soil Protocols* for more details. To get the temperature at or above ground level, you should insert the thermometer through a hole in the bottom of an upside-down heavy paper cup. The cup acts as a shield around the tip of the thermometer so that direct sunlight and other extraneous sources of heat do not cause inaccurate readings. The thermometer should remain in one location until the temperature does not vary for 1-2 minutes. To get the temperature of the soil below ground, carefully insert the tip of the thermometer 2.5 cm into the ground.
2. **Precipitation–** Determine the amount of rainfall for the last growing season. If you do not conduct the *GLOBE Precipitation Protocol,* you can obtain the information from a local meteorologist or through the GLOBE Web site links. Has it rained lately? What evidence is there – a lake, streams, water retainment areas, puddles?
3. **Sunlight –** When the sun is shining, look around the site for signs of sunlight on the trees, shrubs and on the ground. How much sunlight reaches the top of the trees? How much is reaching the ground? If the plants are absorbing sunlight, what happens to the sunlight? Is it being reflected (that means the leaves would be shiny like aluminum foil)?

Note: Many younger students will think that plants get their food from the soil and will not think the sun is used to make food during photosynthesis. They will think that sun helps plants to grow, but are not sure how or why. Question students on how plants use sunlight in their life cycle. As an extension, paperclip a small piece of paper on a leaf for a couple days to see what happens to it.

4. **Wind –** How strong is the wind blowing in the site? Use the *Beaufort Scale Work Sheet* to measure the wind speed. Are the leaves or grasses shaking in the breeze? Is the wind strong enough to bend small branches or flattened grasses? Large branches? Use a piece of paper as a temporary windsock. One student can hold the paper away from the body, while the others observe whether it hangs straight down or blows out at an angle. Use a compass to determine from which direction the wind seems to be blowing.
5. **Animal Life –** Note and record the various kinds of animals at the site (insects, birds, reptiles, fish, amphibians, mammals). Record evidence of animals such as scat, tracks, burrows, or chewed leaves. Which is the most dominant?
6. **Plant Life –** Observe the various types of plants at the site (large trees, small trees, shrubs, small plants, grasses). Record the

most common types of plants found in the site. Which is the most dominant?

7. Report your findings and share what you have learned as your teacher instructs.

After listening to each other's reports, the class can complete a large composite class chart. Use this composite chart as a basis for discussing differences between the locations and interactions the students observe among the various elements.

Discussion Questions

1. Which site had the highest air temperature? The lowest? The most wind? The least wind?
2. What relationship does light seem to have with air temperature? With soil moisture? With plants?
3. How do the various sites differ in numbers or diversity of species of animals and plants? How are they similar?
4. Which sites showed the greatest seasonal variations in the parameters you measured? Why should this be so?
5. Which of the six variables studied seems most important for determining the character of the environment at each site? What makes you think so?
6. What are the inputs to the various systems? Which factors are outputs? Which of the six measured elements stays within the system? Draw a picture or a flow chart depicting this.
7. Have students draw diagrams of their systems or make up a story about their system tracing the path of solar energy through the system.

Further Investigations and Ideas for Assessment

1. Visit the sites selected again at different seasons and repeat the investigation. How have the various factors changed? What factors influenced the change? If you have deciduous trees, what factors might have influenced the leaf on or leaf off process during the course of the year?
2. Have students construct terrariums. Try to make the terrarium more like one of your system sites. Try to model your system based upon the data you collected in this learning activity. Add wind, moderate the temperature and/or water, allow the appropriate amount of sunlight, add plants, and mimic animal effects. Try for seasonal variations. Can you do it? What limitations are there to the models? Can you develop the same cycles that exist in nature between the living and nonliving factors?

Table LAND-SI-1: Beaufort Scale

Wind Speed kmph	Wind Speed mph	Beaufort Number	Wind Description	Observed Effects on Land
<1	<1	0	Calm	Calm, no movement of leaves
1–3	1–3	1	Light air	Slight leaf movement, smoke drifts, wind vanes moving
6–11	4–7	2	Light breeze	Leaves rustling, wind felt, wind vanes moving
12–19	8–12	3	Gentle breeze	Leaves and twigs in motion, small flags and banners extended
20–29	13–18	4	Moderate breeze	Small branches moving; raising dust, paper litter, and dry leaves
30–38	19–24	5	Fresh breeze	Small trees and branches swaying, wavelets forming on inland water ways
39–49	25–31	6	Strong breeze	Large branches swaying, overhead wires whistling, difficult to control an umbrella
50–61	32–38	7	Moderate gale	Entire trees moving, difficult of walk into wind
62–74	39–46	8	Fresh gale	Small branches breaking, difficult to walk, moving automobiles drifting and veering
75–87	47–54	9	Strong gale	Roof shingles blown away, slight damage to structures, broken branches littering the ground
88–101	55-63	10	Whole gale	Uprooted and broken trees, structural damage
102–116	64–73	11	Storm	Widespread damage to structures and trees, a rare occurrence
>117	>74	12–17	Hurricane	Severe to catastrophic damage

Site Seeing

Field Data Work Sheet

Name(s): _____ **Date:** _____

_____ **Time:** _____

Type of Site (circle one): Open Field Site Near Water Land Cover Sample Site

System Component	Data
Temperature - 0.5 m above ground - at ground level - at 2.5 cm deep in the soil	
Precipitation - amount - rain lately? - evidence	
Sunlight - reaches top of trees - reaches the ground - what happens to sunlight?	
Wind - Beaufort scale # - strength - direction	
Animal Life - kinds - evidence - most dominant?	
Plant Life - types - most dominant?	

Other observations (Metadata) and drawings: